

The New Zealand Recent species of *Muricopsis* Bucquoy, Dautzenberg and Dollfus, 1882 (Gastropoda: Muricidae)

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ABSTRACT

Four New Zealand Recent *Muricopsis* species are recognized: *M. octogonus* (Quoy and Gaimard, 1833), *M. mariae* (Finlay, 1930) and *M. profunda* new species, which belong in subgenus *Murexsul* Iredale, 1915, and *M. scotti* new species, which is referred to *Rolandiella* new subgenus together with the southern Australian species *M. umbilicatus* (Tenison Woods, 1876). Their shells and radulae are illustrated and distributions plotted. *Muricopsis mariae* is interpreted as a species rather than a chronosubspecies of *M. espinosus* (Hutton, 1886) as has been traditional.

Key words: New Zealand, Muricidae, *Muricopsis*, *Murexsul*, new taxa.

INTRODUCTION

For a number of years a large, locally common, sublittoral form of *Muricopsis* from rocky ground off northern New Zealand was suspected to be an unnamed species distinct from *M. octogonus* (Quoy and Gaimard, 1833). Extensive collecting and field observations led Scott (1989) to conclude that distinct species were indeed involved, and he reported differences in shell morphology, operculum colour and habitat. On areas of rocky ground at 12–15 m depth, cut by channels with sand floors, Scott found that whereas *M. octogonus* typically lives both on horizontal rocky surfaces with dominant kelp (*Eklonia radiata*) and on sand at the channel floors, the undescribed species typically lives on the channel walls amongst abundant sponges and brachiopods. The preference for vertical sublittoral rock surfaces would account for its extreme rarity on beaches and in dredge and trawl samples. The following revision was initiated after recent discovery of well preserved juvenile specimens (hitherto unavailable or unrecognised) of the undescribed species, which show additional differences from *M. octogonus* that in turn suggest a closer relationship with the southern Australian species *M. umbilicatus* (Tenison Woods, 1876). Abbreviations and text conven-

tions are: AIM, Auckland Institute and Museum; BMNH, The Natural History Museum, London; CM, Canterbury Museum, Christchurch; IS, Ian Scott collection, Auckland; KWB, Kevin W. Burch collection, Whangarei (includes the outstanding collection formed by our late friend Dave Gibbs); NMNZ, Museum of New Zealand Te Papa Tongarewa, Wellington; NZGS, Institute of Geological and Nuclear Sciences, Lower Hutt. Unless specified, all material is at NMNZ (registration numbers preceded by “M.”). Length dimension precedes width in all cited measurements.

SYSTEMATICS

Superfamily Muricoidea Rafinesque, 1815

Family Muricidae Rafinesque, 1815

Subfamily Muricidae Rafinesque, 1815

Genus *Muricopsis* Bucquoy, Dautzenberg and Dollfus, 1882

Muricopsis Bucquoy, Dautzenberg and Dollfus, 1882: 19. Type species (by original designation): *Murex blainvillii* Payraudéau, 1826; Recent, Mediterranean.

Subgenus *Murexsul* Iredale, 1915

Murexsul Iredale, 1915: 471. Type species (by original designation): *Murex octogonus* Quoy and Gaimard, 1833; Recent, New Zealand.

Remarks: Ponder (1972) considered *Murexsul* to be a synonym of *Muricopsis*, though Radwin and D’Attilio (1976), Vokes (1970, 1988) and Beu and Maxwell (1990) have treated them as distinct genera. We agree with Vokes (1988) that they are closely related, but like Houart (1988, 1991, 1993), prefer to interpret *Murexsul* as a subgenus of *Muricopsis*.

Muricopsis (*Murexsul*) *octogonus* (Quoy and Gaimard, 1833) (Figures 1–15, 24, 25, 33, 37)

Murex octogonus Quoy and Gaimard, 1833: 531, pl. 36, fig. 8, 9; Kiener, 1843: 64, pl. 15, fig. 2; Gray, 1843: 229; Reeve, 1845, pl. 29, fig. 134; Küster and Kobelt, 1869: 79, pl. 28,

- fig. 23; Hutton, 1850: 47; Poirier, 1853: 112; Suter, 1901: 61.
- Murex peruvianus* Sowerby, 1841a: 8, fig. 103; Sowerby, 1841b: 147; Vokes, 1970: 327. Not *Murex peruvianus* Lamarck, 1816 (preoccupied).
- Murex (Phyllonotus) octogonus*.—Tryon, 1850: 110, pl. 30, fig. 272, 273 only (in part—fig. 274 = *Muricopsis cuspidatus* (Sowerby, 1879)); Hutton, 1854: 218.
- Murex dipsacus*.—Tryon, 1850: 110, pl. 30, fig. 251 only. Not Broderip, 1833.
- Murex octogonus* var. *umbilicata*.—Suter, 1901: 61. Not Tenison Woods, 1876.
- Murex (Muricantha) octogonus*.—Suter, 1913: 400, pl. 48, fig. 1.
- Murex (Muricantha) octogonus* var. *umbilicatus*.—Suter, 1913: 401. Not Tenison Woods, 1876.
- Hexaplex (Murexsul) octogonus*.—Iredale, 1915: 471; Wenz, 1941: 1090, text fig. 3096.
- Hexaplex (Murexsul) octogonus* var. *umbilicatus*.—Iredale, 1915: 471. Not Tenison Woods, 1876.
- Murexsul octogonus*.—Finlay, 1926: 419; Vokes, 1964: 13, fig. 20, 50, 61; Ponder, 1968: 31, fig. 1, 37–41; Vokes, 1970: 327; Fair, 1976: 63, pl. 17, fig. 239; Radwin and D'Attilio, 1976: 163, text fig. 104, pl. 26, fig. 6, 7; Abbott and Dance, 1983: 143, text fig.; Scott, 1989: 6, text figs.; Beu and Maxwell, 1990: 359, pl. 48l.
- Murexsul cucierensis* Finlay, 1926: 419 = *nomen nudum*.
- Murexsul cucierensis* Finlay, 1927: 457, pl. 24, fig. 2.
- Murex (Murexsul) octogonus*.—Thiele, 1929: 290; Shikama and Horikoshi, 1963: 69, text fig. 104.
- Murex (Murexsul) ednae* Smith, 1940: 43, pl. 2, fig. 10.
- Muricopsis octogonus octogonus*.—Ponder, 1972: 237, text fig. 3/24.
- Murexsul octogonus* [sic].—Kaicher, 1975, card 1608.
- Muricopsis octogonus*.—Powell, 1979: 170, pl. 35, fig. 1; Scott, 1989: 6, text figs.; Hart, 1993: 44, text fig. (in part—far right figure = holotype of *M. scotti* new species).

Type material: *M. octogonus*: syntypes (2), including the originally figured specimen (Figure 15) MNHN, Bay of Islands, New Zealand; *M. peruvianus*: repository of type material unknown (not located at BMNH, K.M. Way, pers. comm.), "Pacosmayo, Peru" = New Zealand; *M. cucierensis*: holotype AIM 70500, off Cuvier Island, 73 m; *M. ednae*: repository of type material unknown, "Japan" = New Zealand.

Other material examined: About 1000 specimens in NMNZ (152 lots) and K.W. Burch (24 lots) collections.

Distribution (Figure 37): Pleistocene (Castlecliffian) to Recent. Three Kings Islands and North Island, New Zealand, as far south as Kapiti Island (west coast) and Mahia Peninsula (east coast), 0–508 m; taken alive at low tide to 121 m.

Remarks: *Muricopsis octogonus* is exceptionally variable in teleoconch morphology, and there is complete intergradation between the most extreme of the forms illustrated here (Figures 1–15). Despite great variation in sculpture of the last few whorls in adults, all of the specimens are identical in protoconch and early teleoconch morphology. Moreover, we could detect no differences between the most extreme forms in radular

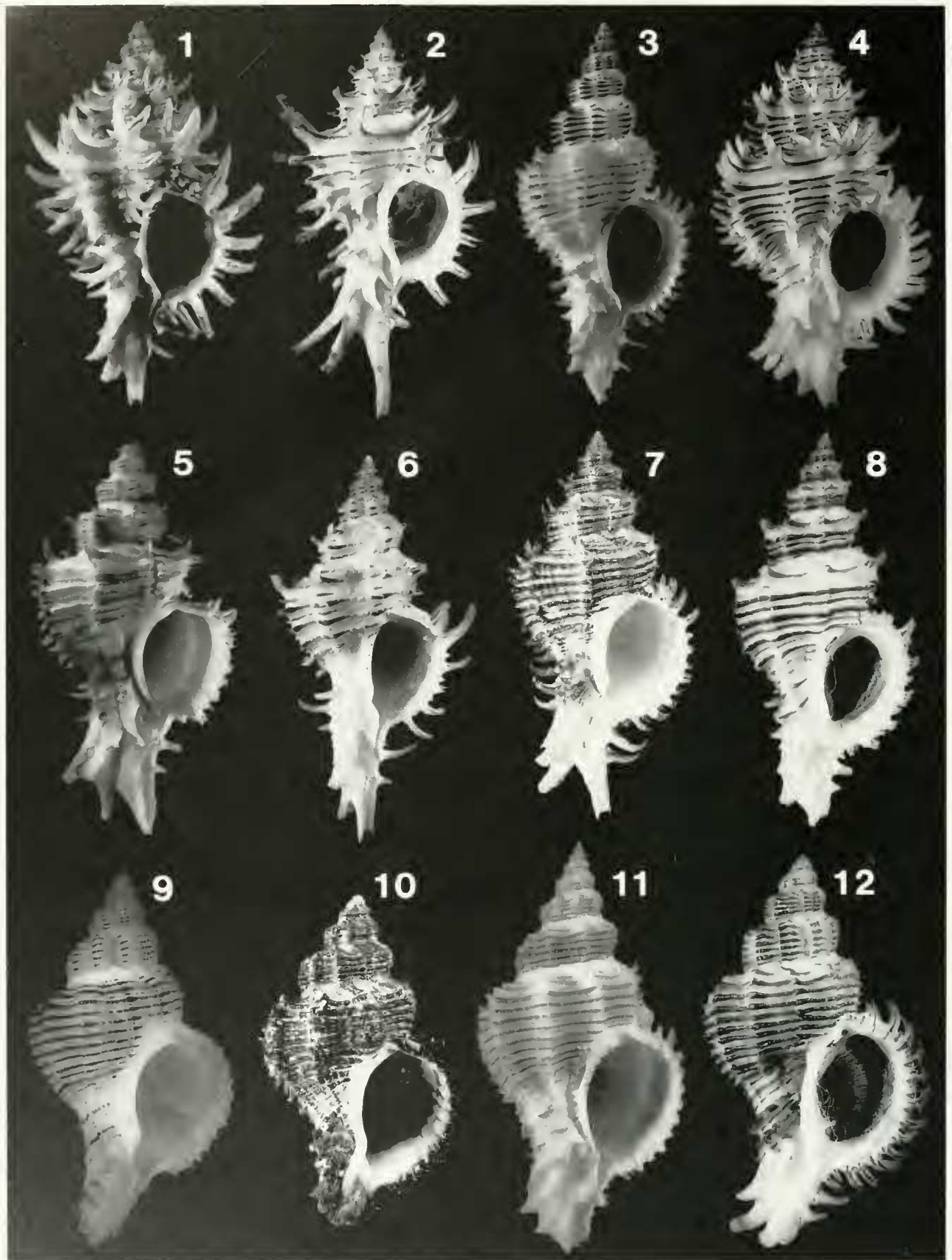
morphology or external anatomy. It thus seems clear that all specimens under consideration here represent a single highly variable species.

Mature specimens range from 29 to 92 (est.) mm in length. Spines may be entirely absent, or short to long. The secondary spiral cords may remain weaker than the primaries and spineless throughout, or they may enlarge to resemble the primaries before the last adult whorl, and some or all may develop spines that may be as long as those on the primaries. The siphonal canal may be short and broad and the fasciole rounded with low ridges, or the canal may be long and narrow, and the fasciole set with canals from earlier stages of growth that encircle a narrow to rather large false umbilicus. The teleoconch may be reddish brown with black spiral cords, or white or cream with yellowish or (typically) reddish brown spiral cords. Shells with dark, extensive pigmentation predominate in the littoral and locally to about 12 m. Specimens with short spines, and with secondary spirals that enlarge to resemble the primaries predominate in the littoral and locally to about 50 m, whereas long-spined shells on which the secondary spirals remain weaker than the primaries typically occur deeper than about 30 m, though locally as shallow as about 20 m. The outer lip of mature specimens may be smooth or (typically) dentate, and the inner lip rim may be free and projecting below a narrow parietal area, or almost fully adherent. Unusually large, entirely spineless shells occur off Spirits Bay, where they intergrade with short-spined specimens (Figures 9, 11).

Muricopsis octogonus has been observed on a number of occasions on sandy substrata, boring holes in and feeding upon the shallowly-burrowing bivalve *Tawera spissa* (Deshayes, 1835) (I. Scott, pers. comm.; K.W.B., pers. obs.). What it eats on rocky ground remains to be established. The radula is illustrated (Figure 33) for comparison with those of *M. mariae*, *M. scotti* and *M. umbilicatus* (Figures 34–36).

There are no records of *M. octogonus* from the west coast of the North Island between Cape Maria van Diemen and Cape Egmont, or from the east coast south of Mahia Peninsula (Figure 37), and it would seem that the present distribution off the northeastern and southwestern North Island is relictual, perhaps dating from prior to the last glacial maximum.

How far back this species extends in the fossil record is unclear. Specimens from a Late Pliocene (Nukumaruan) horizon near Waipukurau (GS10858, former cutting on disused section of Ashcott Road, coll. A.G. Beu, NZGS) appear to be indistinguishable from Recent specimens in teleoconch morphology, but differ in having smoothly rounded instead of angulate protoconchs as in Recent material (Figure 30) (see below). If it proves to be specifically distinct from *M. octogonus*, it may be assignable to *M. dilucidus* Marwick, 1931 (Early Pliocene, Gisborne District). Some of the New Zealand Cenozoic taxa are scarcely distinguishable from *M. octogonus* or from each other, and it is likely that *M. octogonus* is a direct descendent of one or other of them, such as *M.*



proavitus (Laws, 1935), *M. progenitor* (Laws, 1935), or *M. marwicki* (Maxwell, 1971), all from Middle Miocene (Lilburnian) beds.

Muricopsis (Murexsul) mariae (Finlay, 1930)
(Figures 17, 19, 27, 28, 34, 38)

Murexsul mariae Finlay, 1930: 237; Kaicher, 1978, card 1639; Ben and Maxwell, 1990: 359.

Murexsul espinosus mariae.—Ponder, 1968: 32, fig. 2, 32, 33, 34.

Muricopsis espinosus mariae.—Powell, 1979: 170, pl. 37, fig. 5; Scott, 1989: 6, text figs.

Type material: Holotype AIM 70502, Cape Maria van Diemen, northern New Zealand.

Other material examined: Several hundred specimens in NMNZ (66 lots) and K.W. Burch (13 lots) collections.

Distribution (Figure 38): Three Kings Islands and northeastern North Island, New Zealand, as far south as Anaura Bay, 0–233 m; taken living under rocks at low tide to 40 m.

Remarks: *Muricopsis mariae* differs principally from *M. octogonus* in consistently lacking spines, in being smaller relative to the number of whorls, in having stronger denticles within the adult outer lip, in attaining smaller size (maximum length 29 mm as against ca. 93 mm), in being bluish white instead of typically white within the aperture, and in typically lacking a distinct shoulder angulation, at least on the early teleoconch whorls (some specimens have a distinct shoulder angulation on later whorls). In a sample of both species taken living together at 25 m in Whangaroa Harbour entrance (M.137244, M.74899), the protoconch ranges from 800–1000 μm wide (mean = 900 μm , SD = 0.053, n = 21) in *M. mariae*, and 650–1050 μm wide (mean = 930 μm , SD = 0.097, n = 17) in *M. octogonus*. The largest *M. mariae* protoconch seen is 1250 μm wide (M.133712). The first whorl of the protoconch has a distinct angulation and the summit is more or less flattened in both species. Juveniles of *M. mariae* and *M. octogonus* may be difficult to distinguish, but in *M. mariae* the primary spiral cords are stronger after the second teleoconch whorl, the secondary spirals enlarge more rapidly to resemble the primaries, and the secondaries on the sutural ramp become pigmented early on the third whorl instead of after the third or fourth whorl (compare Figures 24, 25 with 27, 28). Specimens from Cape Maria van

Diemen to North Cape and off the Three Kings Islands are more broadly conical than most specimens from further south (Figures 17, 19) but are otherwise indistinguishable.

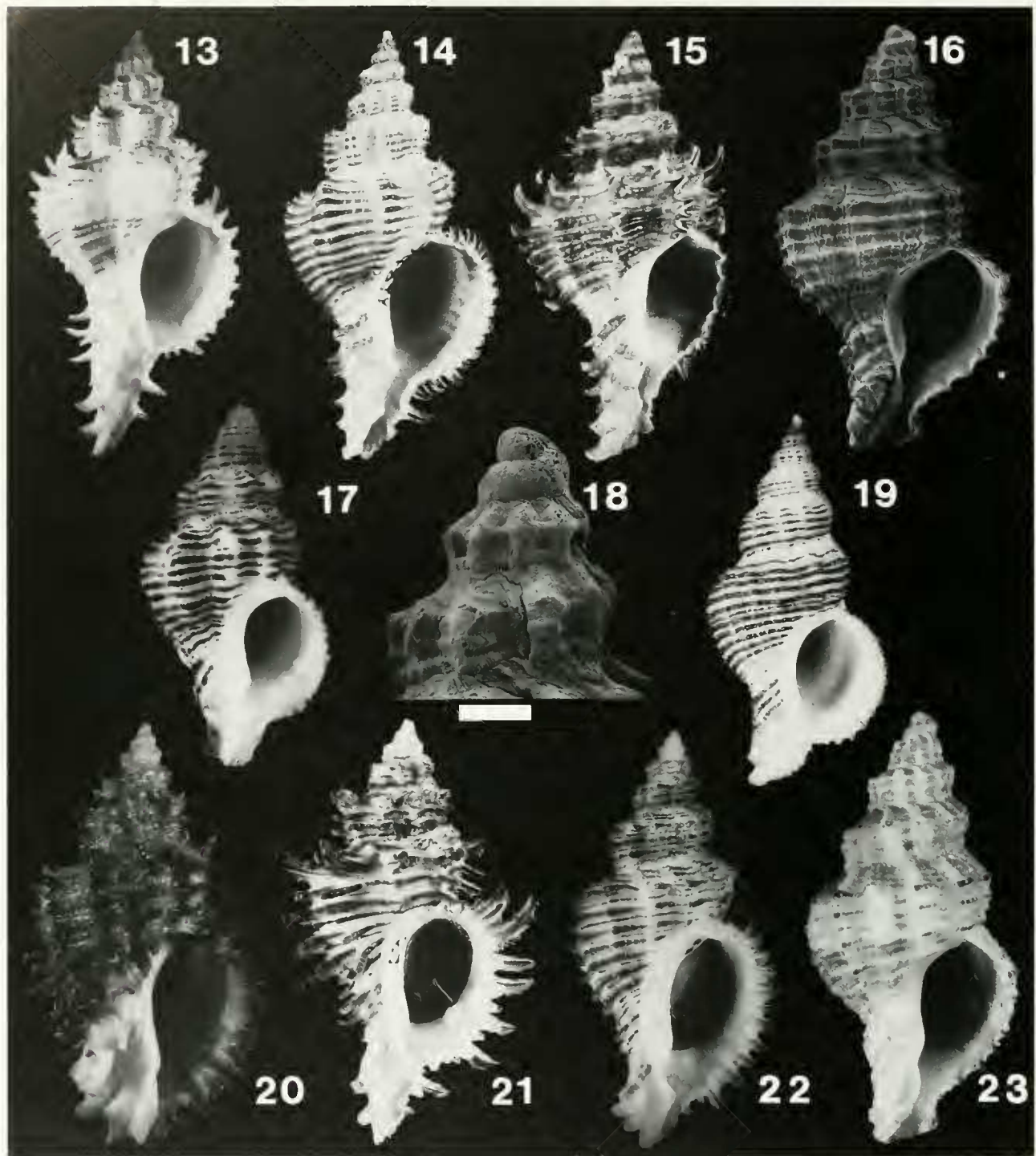
The diet of this species is unknown. The distinctive radula is illustrated (Figure 34) for comparison with that of *M. octogonus*, *M. scotti* and *M. umbilicatus* (Figures 33, 35, 36).

Ponder (1968) interpreted *M. mariae* as a chronosubspecies of *M. espinosus* (Hutton, 1886), though Beu and Maxwell (1990) suggested that they might well be distinct species. Compared with 15 well preserved specimens of *M. espinosus* obtained near Waipukurau (GS10858, map ref. U22/085308, former cutting on disused section of Ashcott Road, WNW of Waipukurau, A.G. Beu, NZGS—lowest Nukumaruan, Late Pliocene), which are indistinguishable from the type material obtained nearby, *M. mariae* differs in having a protoconch that is shorter relative to its width with a shouldered (rarely rounded) instead of rounded, more or less bulbous first whorl (Figure 27), and in having narrower spiral interspaces, especially on the first three or four teleoconch whorls. In most specimens of *M. mariae* the secondary spiral cords enlarge to resemble the primaries more rapidly than in *M. espinosus*. Interestingly enough, the sample includes well-preserved specimens of a larger species that also lacks a shoulder angulation on the protoconch (Figure 30). The status of this larger fossil species is unclear, but it is certainly more closely related to *M. octogonus* than to *M. espinosus*. *Muricopsis espinosus* or a very similar species occurs in the bathyal “coral thicket”, Lake Ferry, Palliser Bay (Mangapanian: Late Pliocene) (Figure 31). The protoconch has thus independently become angulate in the *M. octogonus* and *M. mariae* lineages since the Pliocene. The differences between *M. espinosus* and *M. mariae* in protoconch morphology and similarities in teleoconch morphology suggest that they are distinct species.

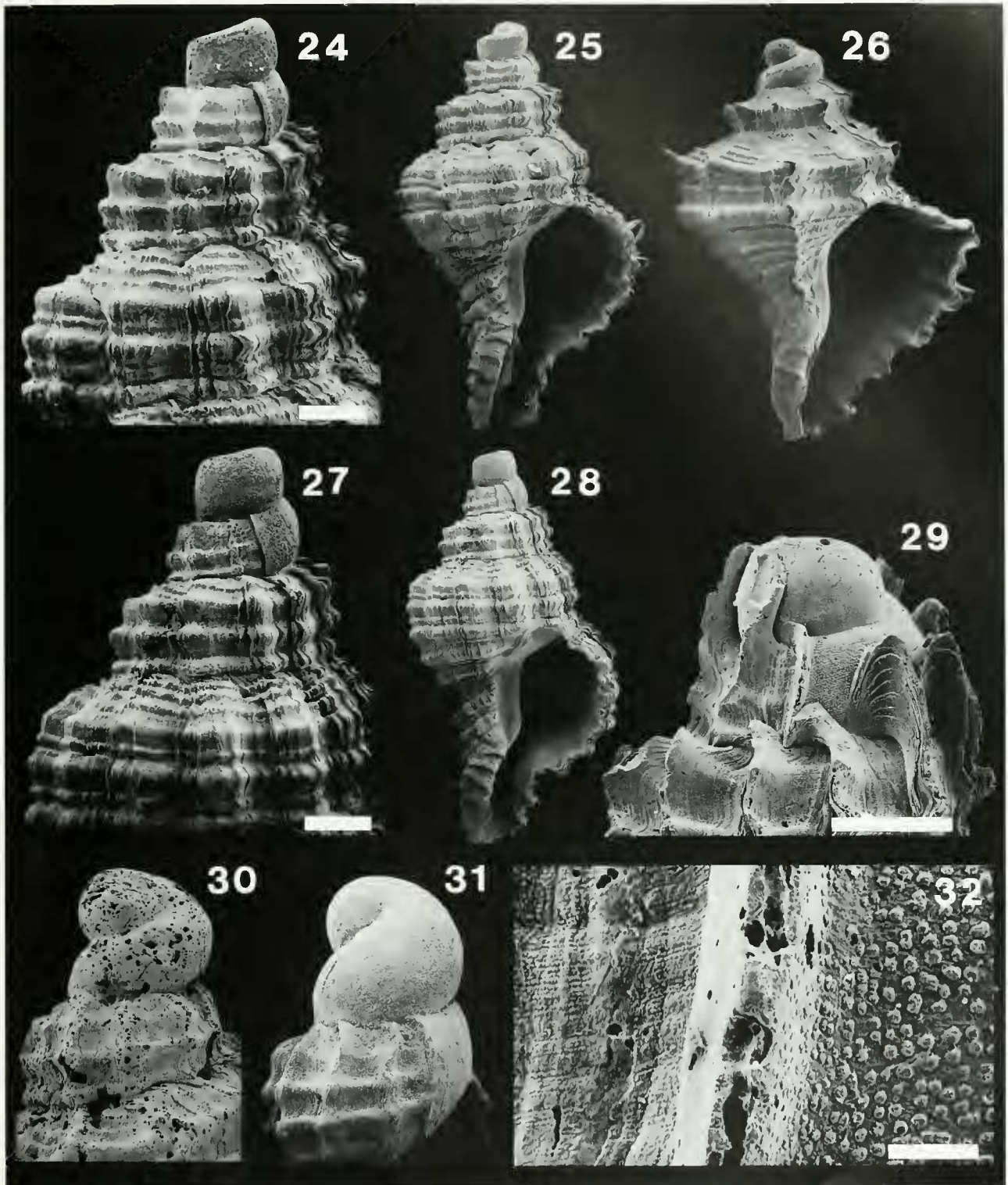
The original description of *Murex espinosus* (Hutton, 1886) is based on more than one specimen, the larger of which provided the cited dimensions (30.0×14.5 mm, CM3294), the smaller of which was subsequently illustrated by Hutton (1893) (28.0×13.3 mm, CM3295). Although these specimens each have two labels (none original) stating that they are “holotype” and “paratype” respectively, they are in fact syntypes because Hutton did not use these unequivocal terms. Ponder (1968, figs 35, 36) effectively designated the larger specimen as lectotype by stating that it was the “holotype”. Incidentally,

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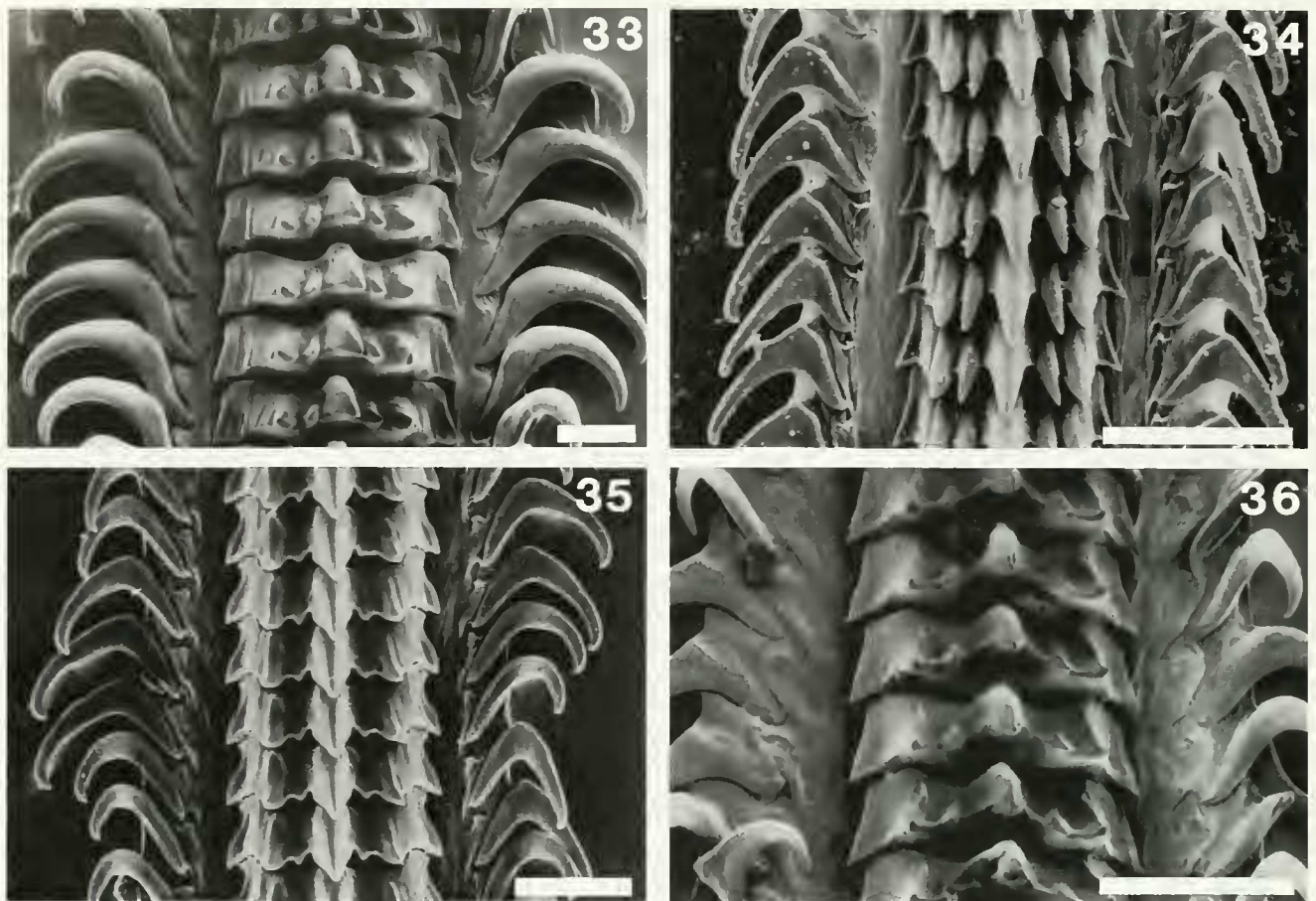
Figures 1–12. Shells of adult *Muricopsis (Murexsul) octogonus* (Quoy and Gaimard). 1. Off Thompson Point, Waiheke Island, 22 m, KWB (length 54 mm). 2. Off Cuvier Island, 70 m, M.5911 (length 78.5 mm). 3. Off Motikahau Island, W of Paparoa, Coramandel, 18–20 m, KWB (length 45.5 mm). 4. Scallop bed near Matiatia Bay entrance, Waiheke Island, 13 m, KWB (length 48 mm). 5. Off Three Kings Islands, craypot, KWB (length 90 mm, est. 93 mm). 6. Ranfiry Bank, East Cape, 31–47 m, M.75079 (length 46 mm). 7. Off Mayor Island, 59–74 m, M.64825 (length 63.5 mm). 8. Off Motihoropapa Island, The Noises, 25 m, KWB (length 42.5 mm). 9. Off Spirits Bay, 48 m, M.137051 (length 54 mm). 10. Hooper Point, Spirits Bay, 12 m, M.134630 (length 29 mm). 11. Off Tom Bowling Bay, 49 m, M.137090 (length 64 mm). 12. Reotahi, Whangarei, low tide, KWB (length 45.5 mm).



Figures 13–23. Shells of *Muricopsis* species (all specimens adult except 18). **13–15.** *Muricopsis* (*Murexsul*) *octogonus* (Quoy and Gaimard). **13.** Ranfurly Bank, East Cape, 89–94 m, M.64812 (length 46 mm). **14.** Whangaroa Harbour entrance, 25 m, M.74899 (length 38 mm). **15.** originally figured syntype, MNHN (length 35.5 mm). **16, 23.** *Murexsul* (*Muricopsis*) *profunda* new species, holotype, off Three Kings Islands, 91 m, M.70356. **17, 19.** *Muricopsis* (*Murexsul*) *mariae* (Finlay). **17.** Archway Island, Three Kings Islands, 15 m, M.117096 (22.3×12.3 mm). **19.** Whangaroa Harbour entrance, 25 m, M.137244 (26×13 mm). **18, 20.** *Murexsul* (*Rolandiella*) *umbilicatus* (Tenison Woods), Gulf St. Vincent, South Australia, South Australian Museum (Figure 20, length 32 mm). **21, 22.** *Murexsul* (*Rolandiella*) *scotti* new species. **21.** Holotype, Mathesons Bay, Leigh, 6–9 m, M.135186 (length 44 mm). **22.** Paratype, Southeast Bay, Great Island, Three Kings Islands, 15 m, KWB (length 53.5 mm). Scale line = 1 mm.



Figures 24–32. Early whorls of *Muricopsis* species. **24, 25.** *Muricopsis (Murexsul) octogonus* (Quoy and Gaimard), Whangaroa Harbour entrance, 25 m, M.74899 (shell length 7.05 mm). **26.** *Murexsul (Rolandiella) scotti* new species, submarine cave S side of Rosemary Rock, Princes Islands, Three Kings Islands, 20 m, M.117084 (length 6 mm). **27, 28.** *Muricopsis (Murexsul) mariae* (Finlay), Whangaroa Harbour entrance, 25 m, M.137244 (shell length 4.75 mm). **29, 32.** *Muricopsis (Murexsul) profunda* new species, early whorls (29) and teleoconch (left) and protoconch (right) microsculpture (32), NW of Great Island, Three Kings Islands, 310 m, M.93876. **30.** *Muricopsis (Murexsul)* sp. aff. *octogonus* (Quoy and Gaimard), GS10858, Ashcott Road, Waipukurau, shallow water, Late Pliocene (lowest Nukumaruan), NZGS TMS078. **31.** *Muricopsis (Murexsul)* sp. cf. *espinosus* (Hutton), "coral thicket", Lake Ferry, Palliser Bay, bathyal, Late Pliocene (Mangapanian), M.40408. Scale line for figure 32 = 50 μ m, other scale lines = 500 μ m.



Figures 33–36. Radulae of *Muricopsis* species. **33.** *Muricopsis* (*Murexsul*) *octogonus* (Quoy and Gaimard), off Te Arai Point, Northland, 41 m, M.137251 (shell length 65 mm). **34.** *Muricopsis* (*Murexsul*) *mariae* (Finlay), Governors Pass, Great Barrier Island, 11–29 m, M.21784 (shell length 22 mm). **35.** *Muricopsis* (*Rolandiella*) *scotti* new species, off Cape Rodney, 11–13 m, M.137416 (shell length 40 mm). **36.** *Muricopsis* (*Rolandiella*) *umbilicatus* (Tenison Woods), Edithburgh, South Australia; South Australian Museum, Adelaide, unregistered (shell length 28 mm). Scale lines = 50 μ m.

this type material was mislaid until recently, and omitted from the catalogue of type and figured fossils in the Geology Department of the Canterbury Museum (Bradshaw *et al.*, 1992).

Muricopsis (*Murexsul*) *profunda* new species
(Figures 16, 23, 29, 39)

Description: Shell up to 10.5 mm high (holotype adult?), fusiform, of moderate thickness; protoconch and teleoconch pale orange, adapical 4 primary spirals and secondary spirals between them reddish brown on last whorl. Protoconch 830–870 μ m wide excluding flared rim, of 1.5 convex whorls, covered with minute hemispherical granules, summit of first whorl angulate, last half whorl rather evenly convex. Teleoconch of 4.5 regularly expanding whorls; first whorl broadly convex; subsequent whorls with pronounced supramedian angulation, sutural ramp broad and flat, side broadly convex, smoothly confluent with siphonal canal. Sculpture consisting of axial varices, and rounded primary and sec-

ondary spiral cords. Axial varices strongly retracted from adapical insertion throughout, 12 on last whorl (holotype), narrow on 1st whorl, sloping adaxially so that bases are overhung, blade like and strongly adapically produced above protoconch/teleoconch suture and cemented to side of last whorl of protoconch, extending beyond adapical extremity of last protoconch whorl or to about mid whorl length. Axial varices on subsequent whorls becoming thicker and rounded, each surmounted by 4 or 5 fine, collabral, adaxially sloping, axial lamellae. Axial interspaces with fine collabral growth lines and a few lamellar growth lines. Primary spiral cords numbering 3 on spire and 3 on base; spire spirals commencing immediately, similar throughout, adapical spiral at shoulder angulation, abapical spiral bordering suture; adapical 2 basal spirals similar to spire spirals, abapical spiral stronger, widely separated. Secondary spirals numbering commencing on 3rd whorl, remaining weaker than primaries, 2 on ramp, 1 between each primary spiral, 3 between abapical basal primaries, and 1 between abapical basal primary and tip of canal. Siphonal canal of moderate



Figures 37. Distributions of New Zealand Recent *Muricopsis (Murexsul) octogonus* (Quoy and Gaimard) (500 and 1000 m isobaths indicated).



Figure 38. Distributions of New Zealand Recent *Muricopsis (Murexsul) mariaae* (Finlay) (500 and 1000 m isobaths indicated).

length, gently flexed, partly enclosed by thin extension of inner lip. Aperture pyriform; outer lip rather thin at rim, weakly thickened within, simple; inner lip fully adherent adapically, rim free at abapical extremity and extending almost to canal tip. Animal unknown.

Type material: Holotype NMNZ M.70356, 34°11'S, 172°10'E, off Three Kings Islands, northern New Zealand, 91 m, 19 February 1974, r.v. *Acheron*. Paratypes: 33°59.2'S, 172°13.6'E, 18 km N of Great Island, Three Kings Islands, 155 m, 23 June 1978, r.v. *Tangaroa* (1 juvenile, M.137247); 34°06.5'S, 172°04.7'E, 11 km NW of Great Island, 310 m, 30 June 1978, r.v. *Tangaroa* (1 juvenile, M.93876).

Other material examined: 34°00.9'S, 171°44.7'E, Middlesex Bank, NW of Three Kings Islands, 201–216 m, 31 January 1981, r.v. *Tangaroa* (2 juveniles, M.93302); 34°02.0'S, 171°44.0'E, Middlesex Bank, 246–291 m, 31 January 1981, r.v. *Tangaroa* (3 juveniles, M.137245); 34°05.9'S, 171°55.1'E, 24 km NW of Great Island, Three Kings Islands, 710 m, 27 June 1978, r.v. *Tangaroa* (4 juveniles, M.137246); 34°17.6'S, 171°45.3'E, 39 km SW of Great Island, 427 m, 21 June 1978, r.v. *Tangaroa* (3 juveniles, M.94338).

Distribution: Off Three Kings Islands, northern New Zealand, 91–710 m (shells only).

Remarks: *Muricopsis profunda* differs from *M. octogonus* and *M. mariaae* principally in having axial varices that ride up onto the protoconch from the next whorl, in that the outer lip is much more strongly retracted

from the suture, and in that the spiral cords are stronger at equivalent stages of growth and become pigmented at a later stage of growth. The size attained by this species is unclear, though it may not grow much larger than the holotype (length 10.5 mm).

Etymology: Deep (Latin).

Rolandiella new subgenus (of *Muricopsis*)

Type species: *Muricopsis (Rolandiella) scotti* new species; Recent, northern New Zealand.

Diagnosis: Shell similar to those of species of *Muricopsis (Murexsul)*, but with median shoulder angulation and weak abapical 2 primary spiral cords on first 1.5 teleoconch whorls. Inner lip of most specimens upstanding over most of its length.

Description: Shell 21–62 mm high at maturity, spire about as high as last adult whorl or slightly shorter, stout, of moderate thickness. Protoconch of 1.5–2.0 rounded whorls. Teleoconch of mature specimens with 5.5–7.0 convex, shouldered whorls, shoulder median on first 2 whorls, ascending to adapical third or slightly higher on subsequent whorls; sutural ramp shallowly concave; side broadly convex, smoothly confluent with siphonal canal. Primary sculpture consisting of strong, axial varices and spiral cords with spines at intersections. Varices traversing all whorls, angulate in section, numbering 8–11 (7 or 12 in occasional specimens) on adult penultimate whorl. Primary spiral cords rounded, numbering 3 on spire and 3 on base in adults. Adapical primary spiral at

shoulder angulation, peripheral; abapical primary bordering suture throughout, or separating as insertion of last few whorls descends to next primary spiral; adapical and abapical primaries commencing immediately; intermediate primary commencing at about mid first whorl, gradually enlarging to resemble other primaries. Abapical basal primary spiral widely separated from adjacent primary, interspaces of other primary spirals closer and of similar width to each other. Secondary spirals progressively developing, 1–5 on sutural ramp, 1 each in some or all interspaces of primary spirals, 0–3 between abapical basal primary spiral and tip of canal, others on summits of some or all primary spirals, 1 or more enlarging to resemble primaries on last adult whorl. Primary and 1 (abapical shoulder spiral) or more secondary spirals produced as short to moderate-length spines at varices, spines on primary spirals of similar length or shoulder spiral longest. Secondary axial sculpture comprising fine collabral growth lines that are raised as thin, fragile lamellae on ramp against suture and where intersecting spiral sculpture. Aperture pyriform. Outer lip thickened within at maturity, strongly so in particularly large specimens, which may also develop spirally elongate denticles. Inner lip thin, fully adherent over adapical third or quarter, abapical part typically free, flared and strongly projecting, abapical extremity extending well beyond flexure of siphonal canal. Siphonal canal of moderate length, almost enclosed by infolding; siphonal fasciole strong, forming an umbilicus in some very large specimens. Radula and operculum similar to those in *Muricopsis* (s. str.) and *Murexsul*.

Remarks: *Rolandiella* is introduced for *Muricopsis scotti* new species from northern New Zealand, and *M. umbilicatus* (Tenison Woods, 1876) from southern Australia, both of which resemble typical *Murexsul* species in gross facies, but differ in that the shoulder spiral is situated medially on the early spire whorls then ascends adapically, and the intermediate primary spiral on the spire commences later than the others and develops slowly. By contrast, in *Muricopsis* species, all three primaries are strong and commence immediately on the first teleoconch whorl, and the shoulder spiral borders the suture then descends abapically over subsequent whorls.

None of the named New Zealand Cenozoic species referred to *Murexsul* by Beu and Maxwell (1990) seem to belong in *Muricopsis* (*Rolandiella*), though the relationships of the Early Miocene species *Muricopsis echinophorus* (Powell and Bartrum, 1929) are unclear because the early teleoconch morphology is unknown.

Both *M. (Rolandiella) scotti* and *M. (R.) umbilicatus* have large, rounded, paucispiral protoconchs indicating non-planktotrophic development, and suggesting that they have either crawl-away larvae or drifting larval stages of short duration. We suppose that they are derived from a common ancestor with planktotrophic larval development that had a trans-Tasman distribution. How far back in time this putative common ancestor may have



Figure 39. Distributions of New Zealand Recent *Muricopsis* (*Murexsul*) *profunda* new species (circle) and *Muricopsis* (*Rolandiella*) *scotti* new species (squares) (500 and 1000 m iso-baths indicated).

lived is impossible to estimate without fossil records or molecular data.

Etymology: After Roland Houart, Belgium, in appreciation of his outstanding contribution to world muricid systematics.

Muricopsis (Rolandiella) scotti new species
(Figures 21, 22, 26, 35, 39)

Muricopsis species Scott, 1989: 6, text figs.

Muricopsis octogonus.—Hart, 1993: 45, right text fig. only
(=holotype). Not Quoy and Gaimard, 1833.

Description: Shell up to 62 mm high, fusiform, spire about as high as last adult whorl or slightly shorter, stout, of moderate thickness. Protoconch and first 1 or 2 teleoconch whorls white, subsequent whorls white or pale buff, primary, secondary and some finer spiral cords reddish brown, aperture porcellaneous white. Protoconch sharply delineated by low varix, of 1.5–2.0 smooth, convex whorls. Teleoconch of up to 7 convex, shouldered whorls, shoulder median on first 2 whorls, ascending to adapical third or slightly higher on subsequent whorls; sutural ramp shallowly concave; side broadly convex, smoothly confluent with siphonal canal. Primary sculpture consisting of strong, axial varices and spiral cords with spines at intersections. Varices traversing all whorls, angulate in section, numbering 8–11 (7 or 12 in occasional specimens) on adult penultimate whorl. Primary spiral cords rounded, numbering 3 on spire and 3 on base in adults. Adapical primary spiral at shoulder an-

gulation, peripheral; abapical spire spiral bordering suture at first, separating as insertion of last few whorls descends to next (formerly adapical basal) primary spiral; adapical and abapical spire spirals commencing immediately; intermediate spire spiral commencing at about mid first whorl, slowly enlarging to resemble abapical spire spiral and basal primary spirals. Abapical basal primary spiral widely separated from adjacent primary; interspaces of other primary spirals closer and of similar width to each other. Secondary spirals appearing progressively; numbering 3–5 on sutural ramp, 5–7 in zone comprising summit of shoulder spiral space between it and adjacent primary; usually 3 or 4 on summits of other primary spire spirals, 3 or 4 between abapical 2 basal primaries, 3 between abapical basal primary spiral and tip of canal, and generally 1 each in some or all interspaces of primary spirals, most or all secondaries remaining weaker than primaries throughout, or some enlarging to resemble primaries on last adult whorl. Primary and some secondary spirals produced as short to moderate-length spines at varices, shoulder spines longer than others on spire, spines on larger spirals typically of similar length on last adult whorl. Secondary axial sculpture comprising fine collabral growth lines that are raised as thin, fragile lamellae on ramp against suture and where intersecting spiral sculpture. Aperture pyriform. Outer lip thickened within at maturity, strongly so in particularly large specimens, which may also develop spirally elongate denticles. Inner lip thin, fully adherent over adapical third or quarter, abapical part typically free, flared and strongly projecting, abapical extremity extending well beyond flexure of siphonal canal. Siphonal canal of moderate length, almost enclosed by infolding; siphonal fasciole strong, forming an umbilicus in some very large specimens. Operculum with terminal nucleus, yellowish brown. Radula (figure 35): Central teeth each with strong, conical central cusp; smaller, conical lateral and marginal cusps, and 2 very small inner lateral denticles that are well separated from lateral cusp. Lateral teeth narrow.

Type material: Holotype NMNZ M.138186, Mathesons Bay, Leigh, northern New Zealand, 6–9 m, February–March 1992, D.W. Gibbs (ex D.W. Gibbs and K.W. Burch collections). Paratypes: 34°09.5'S, 172°08.8'E, Southeast Bay, Great Island, Three Kings Islands, 20–22 m, 4 March 1997, K.W. Burch and D.D. Crosby (2 juveniles, M.134760); Southeast Bay, alive, 18 m, 18 May 1982, K.W. Burch (6, KWB); Princes Islands, Three Kings Islands, 15 m, 29 November 1983, G.S. Hardy and A.L. Stewart (1, M.75135); S side of Southwest Island, Three Kings Islands, alive, 27 m, 12 February 1986, G.S. Hardy (2, M.84267); off Cape Maria van Diemen, craypot, May 1991 (1, KWB); Whangaroa Harbour entrance, alive, 18 m, November 1995, K.W. Burch and D.W. Gibbs (2, KWB); Rikoriko Cave, Poor Knights Islands, alive, 30–40 m, 1982, M.H.B. O'Neill (1, M.75181); Poor Knights Islands, alive, May 1979, A.S.W. Penniket (1, M.133691); Poor Knights Islands,

December 1980, K.W. Burch (1, M.133692); Poor Knights Islands, alive, 15–20 m, 1983, K.W. Burch (4, KWB); Poor Knights Islands, alive, 1970, 1972, W. Doak (5, M.133690); South Cave, Poor Knights Islands, alive, 17 m, 21 May 1969, A.N. Baker (1, M.23617); South Harbour, Poor Knights Islands, alive, 25 May 1969, A.N. Baker (3, M.23618); off Cape Karikari, 30 m, 20 June 1981 (1, M.133694); Urquarts Bay, Whangarei Heads, alive, March 1965 (1, M.133695); "The Canyon", N side of Burgess Island, Mokohinau Islands, alive, 15–21 m, January 1985, D.W. Gibbs (3, KWB); Maori Island, Leigh, 22 May 1975, A.S.W. Penniket (1, M.133695); NE of Mathesons Bay, Leigh, alive, 18 m, May 1995, D.W. Gibbs (1, M.127040); Mathesons Bay, alive, 6–10 m, February–March 1992, D.W. Gibbs (6, KWB); S of entrance to Omaha Cove, Leigh, 20 m, December 1967, I. Scott (2, IS); off Little Barrier Island, alive, craypot. T. Riley (2, M.133693); Cape Rodney, alive, 15 m, June 1987, D.W. Gibbs (7, M.90125); Cape Rodney, alive, 15 m, 4 March 1989, I. Scott (12, M.117277); Cape Rodney, alive, 11–13 m, I. Scott, May 1989 (53, M.137416); Cape Rodney, alive, 18 m, June 1977 (1, M.133698); Waikawau Bay, Coromandel, alive, 16 m, April 1989, D.W. Gibbs (2, KWB); off Needle Island, Mercury Bay, alive, 16 m, January 1985, D.W. Gibbs (3, KWB).

Other material examined: S side of Rosemary Rock, Princes Islands, Three Kings Islands, 20 m, 18 January 1985, F.J. Brook (5, M.117084); off West Island, Three Kings Islands, *Elingamite* wreck, alive, W. Doak (1, M.133696); 34°20.0'S, 173°06.6'E, N of North Cape, 163–168 m, 27 January 1981, r.v. *Tangaroa* (1, M.137225); Rarawa Reef, Great Exhibition Bay, craypots, alive, 40 m, August 1989, I. McMillan (2, M.100382); Rarawa Reef, craypots, alive, 73 m, 28 September 1988, I. McMillan (6, M.95234); Rarawa Reef, craypots, alive, 40 m, 16 December 1987, I. McMillan (3, M.95315); off Cape Karikari, alive, craypots, 1988, I. McMillan (1, M.95322); Henry Island, Whangaruru, alive, 13 m, 5 December 1971, A.N. Baker (1, M.25920); off Hen and Chickens Islands, alive (1, M.2686; 1, M.83882); Mathesons Bay, Leigh, alive, 15–20 m, 26 March 1995, A. Spurgeon (2, M.126998).

Distribution (Figure 39): Three Kings Islands and northeastern North Island, New Zealand as far south as Little Barrier Island, 13–168 m; taken alive at 13–40 m from rocky ground.

Remarks: *Muricopsis scotti* is most similar to the southern Australian species *M. umbilicatus* (Figures 18, 20, 26) in early shell ontogeny and gross adult shell facies than to any New Zealand Recent *Murexsul* species. *Muricopsis scotti* differs from *M. umbilicatus* in a number of details including larger adult size (shell length 34–62 mm versus 21–30 mm), stronger and more numerous secondary spirals, insertion point of the last few whorls descending from the abapical spire spiral to the next (formerly adapical basal) primary spiral, and abapical secondary spiral on the sutural ramp never becoming as

large as the shoulder spiral. The radula of *M. scotti* is similar to those of *M. umbilicatus* and *M. octogonus* (Figures 3, 35, 36).

Muricopsis scotti resembles *M. octogonus* in size, but is readily distinguishable by the following characteristics: orange brown instead of dark reddish brown operculum, rounded instead of angulate protoconch, generally larger aperture, shorter siphonal canal, and much stronger secondary spiral sculpture on the primary spiral cords, especially on the shoulder spiral and between it and the adjacent primary. Unlike *M. octogonus*, which has extremely variable sculpture, *M. scotti* consistently has a distinct shoulder angulation, angular varices and short spines that are not curved backwards, or at most only slightly so. In *M. scotti* the shoulder spiral (adapical primary) is much stronger than the others on the first two teleoconch whorls and occupies a median position, then gradually ascends to about the adapical third on subsequent whorls (Figure 26). By contrast, on the first 1.5 teleoconch whorls in *M. octogonus*, the three primary spiral cords are all strong and similar, and the shoulder spiral commences beside the suture and descends to about the adapical third, remaining there or at the adapical quarter on subsequent whorls (Figure 24). Although the rim of the inner lip may be upstanding or more or less fully adherent in both species, that in *M. scotti* is typically free and more strongly upstanding abapically, and extends abapically further beyond the angulation at the top of the siphonal canal.

Shells of living *M. scotti* are invariably more or less covered with living Bryozoa, barnacles and other epibionts, often with the addition of *Waltonia inconspicua* (Sowerby, 1846) (Brachiopoda), upon which it has been observed to feed (Scott, 1989 and pers. comm; K.W.B., pers. obs.).

Etymology: After Ian Scott, Auckland.

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